# International Support Policies to South-East European Countries

## Lessons (Not) Learned In B-H

MÜLLER

**CHAPTER IX**

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# RESTRUCTURING HIGHER EDUCATION AND SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT (STD)

## 1. Introduction

### 1.1. Scope of Research

The research into this thematic field focuses on the analysis of international assistance to higher education, science and research in B-H, from the aspect of its effects on the economic restructuring and technological development processes. The impact of international assistance to the transformation process of higher education, from the aspect of democratization of the B-H society, confidence building and tolerance, human rights and reconciliation processes fall beyond the scope of this research.

### 1.2. Scientific and Technological Development as a Factor of Economic Development of Developing and Transition Countries

Technical and technological progress has been an extremely dynamic factor of economic development, ensuring an increase of social and personal standards much more effectively than any other, leading to what is known as a society of general well-being. The countries which fail to understand the role of technology and technological strategy risk obsolescence of their technologies which may easily lead to their marginalization in the world's market. Scientific and technological development has, more than ever, become a paradigm of the status and prestige of a social and economic community. It is precisely for this reason that the scientific and technological development for every country has been prioritized as one of the major tasks of the agendas for their management and administrative structures.

The essence of technological progress consists of an optimal utilization of production factors. Only in this way can competition amongst companies and countries be ensured. The development in developed economies is increasingly based on labor creativity. In the projection of its own development, B-H should model itself on developed countries and find possibilities for applying human creative endeavor, achievement and scientific knowledge in the production process.

Economic theory tends to show that the following technical progress determinants have a crucial impact on technological development:

- Science and research
- Education
- Innovations
- Transfer and technology distribution conduits
- Institutional framework and macro- and micro-level technological development organisation
- Investment in scientific and technological development funds
- Standardization, and
- Creative utilization of economic policy measures, which can be used for steering technological development.

At the present time (2001) B-H still lacks its own technological strategy. Its development is one of the priorities in the transition and reconstruction programs for B-H. In developing a strategy within the very complex mechanism of transitional processes, it will be necessary to identify the

technical-technological development determinants which will allow efficient action with a view to steering economic development through a technological strategy. By and large, all countries in transition suffer from a deficit of all types of commodities and especially of modern production and non-production services. This is why the focus of the development of technological strategy should be the acceptance of state-of-the-art production and finding adequate means of production, appropriate to the level of development and size of the country which is going through transition.

A technological strategy represents a clearly defined vision of technological goals, the implementation of which is to be complete within a defined period of time. More precisely, it is an identification of strategic directions of intervention, aimed at achieving changes leading to a desired goal. In developing a technological strategy, the criteria for comparison must be defined against developed countries which have not been faced with destructive wars or transition-related problems. Comparison with other countries in transition and notably with those in the close regional neighborhood can also be useful.

### 1.3. Priorities of International Development Assistance to Scientific and Technological Development of Developing Countries in Transition

The challenges which new technologies of the 21st century and global economy put before the developing countries will be met in diversemanners, depending on financial, institutional, human and infrastructure capacities and potentials of individual countries, as well as on the awareness of the magnitude of the impact which the dominant information communication technologies (ICT) have on development.

According to the findings of analysis made by the National Research Council and the World Bank, developing countries may apply new technologies in a creative manner in the following areas:

- Health protection
- Food production
- Increase of productivity and competition
- Improvement of efficiency in the use and production of power
- Environmental protection

In the field of STD, the EU is promoting and supporting, within the INCO-Copernicus program, co-operation between EU member countries and countries in transition of Central and Eastern Europe (CEE) in the following fields:

- Environmental protection
- Health research
- Informational technology (IT)
- Telecommunication and telemetric technologies
- Industrial technology and new materials
- Production of food and the food processing industry

The countries of Central and Eastern Europe and former USSR countries may also take part in the programs of the Fifth Framework Agreement (1998-2002), under special conditions. They are supposed to fund their participation in those programs from their own funds. The thematic areas of the Fifth Framework Agreement are as follows:

- Quality of life and natural resource management
- User-orientated information society
- Competition and sustainable development
- Nuclear energy

In addition, three horizontal programs are defined within the Fifth Framework Agreement:

- International role of the research community
- Promotion of innovations and support to small and medium-size enterprises (SMEs) for the purpose of their participation in STD programs
- Improvement of human potential and socio-economic development bases.

The countries in transition may also take part in the EUREKA programs. Again, they are expected to fund their participation in these projects.

INCO-Copernicus and EUREKA programs are open to B-H. In addition to these programs, institutions, companies and local governments within B-H may take part in the following EU projects: PHARE, ECOS, Ouverture, ACE and COST.

The UN organization supports STD of the developing countries via their agencies, such as: UNDP, UNIDO and FAO.

## 2. Scientific and Technological Development

### 2.1. General Characteristics of Technological Development of B-H Before 1992

Analysis of the general characteristics of technological development of B-H before 1992 is made with the aim to identify initial indicators of the level of technological obsolescence. It is also necessary to provide an objective definition of the prevailing paradigm of industrial, and thereby technological, development, since it may impact significantly future strategic plans. The level of a technological underdevelopment is defined in comparison to the countries which generate technological development and our neighboring countries and the regional environment.

From 1950, in B-H, the primary emphasis in industrialization was upon basic industries, which left tangible and long-term consequences upon modes and methods of production for the entire period until 1992.

Methods of economic development were adapted to the machine-based production, rather than to requirements of modern development based on the concept of production system development with an extensive use of automation and information technologies. The innovations were mostly to improve the mechanical elements, while in the modern concept, the basis of production is the directing of innovations towards improvements of production processes as well as of the system, with intensive usage of management techniques. Hardware is not the focus of modern production. The focus is rather on the production processes or the activities (software), company organization (orgware), and special training in the organization itself and the application of knowledge in production (smartware). In other words, production increasingly becomes less sequential in nature, and becomes instead increasingly modular, because the development of standardization and standard types has resulted in increased functionality and interchangeability of modules, which may be combined through steering mechanisms.

In modern production, the use of new technologies resulted in an increased shift to machines control. In developed countries this trend intensified in the late 1960's and early 1970's. During that period, however, in B-H import of equipment was made to supplement largely classical industries, at a time when the developed countries had begun to develop and use the expertise of new generations of technology, relying heavily on industrial information technology. This trend in B-H grew into a distinct feature in the period of 1975-1980.

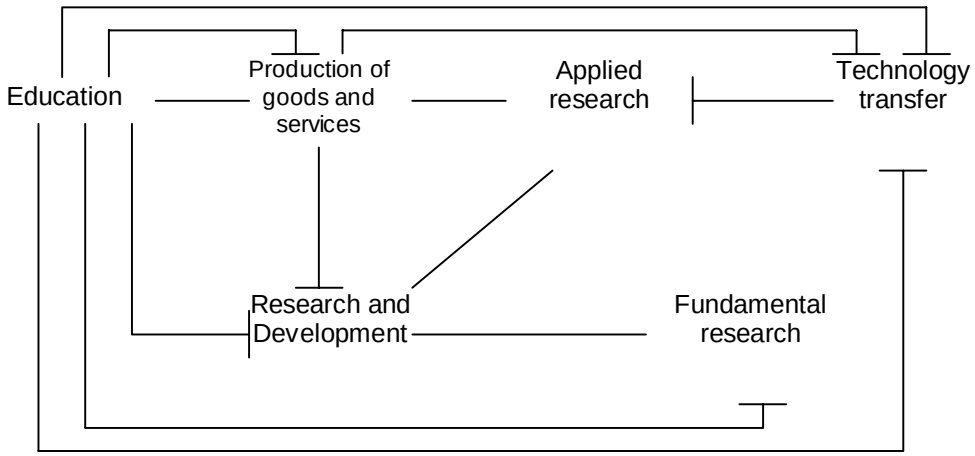
Nevertheless, in other spheres of production B-H industry was also lagging: in applying modern optimal theory, modern methods of production organization (ISO, QA, TQM, JIT, etc.) as well as in enterprise organization (BRP, ABPI, etc.).

Thus, the general situation of industry and technological development in B-H before the war can be described as follows:

- Foreign technology - dominated development

- Machine and process management systems were based mainly on mechanical and electronic elements, with no programming ability.
- During phases of major investments, classical technologies were interrupted, while investment in modernization based on use of industrial information technology was neglected.
- Material and energy consumption and the participation of labor in production exceeded the average of developed countries by a significant margin.

The STD system in B-H was developed within the SFRY STD system. A significant number of industrial plants, notably those in a special-purpose production, tended to be developed within institutes outside B-H. Only some enterprises within B-H which had licenses or direct partnerships with foreign component suppliers were successful in developing a full STD cycle in B-H (Energoinvest, Soda So, UNIS, etc.).




*Scientific and technological development system*

The initial impulse in the system came from technology transfer and knowledge in production, from which other components of the system gradually developed, including:

- Applied research in Research and Development Centers in industry
- Developmental research in industrial institutes (Energoinvest, RMK, Soda So, UNIS) and certain public (state-owned) institutes. Unlike the Republics of Slovenia, Croatia and Serbia (the Jozef Stefan, Rudjer Boskovic and Mihajlo Pupin Institutes), a strong STD State structure was not developed in B-H. Rather, development research was conducted by industrial institutes which also played the role of coordinator of strategic development projects of what became known as Social Objectives.
- Basic research was mainly done by and within universities and the academic community, although there were indeed some examples of successful participation of faculties, in co-operation with institutes, in developmental research.

### 2.2. Organization of Higher Education and STD Management Concept Before 1992

Until 1992 higher education in B-H was organized within the institutional framework of four universities. Sarajevo University was established in 1949, while in the 70's regional centers, which had higher education institutions, were transformed into universities: Banja Luka (1975), Tuzla

(1976) and Mostar (1977). Sarajevo University had its branches in Zenica and Bihac. A total of 37 faculties (departments or schools) were organized within these universities in 1991, 22 of them located in Sarajevo. The funding of higher education institutions was done through the University Education Fund in accordance with the standards and norms of the day. Faculties were directly funded, as universities represented associations of faculties, that is, they had a minor role in decision-making. The enrolment policy was set forth within the Fund. The general system of education was, however, under a crucial influence exerted by politics, that is by the existing ideology. Only certain faculties had significant co-operation with huge industrial complexes such as Energoinvest, UNIS, SODA-SO, Zenica Steelworks, Rudi Cajevec, Sipad, Coal Mines, etc.

The participation of faculties in STD was inconsequential. The STD management system was based on support to large industrial systems, their development centers and institutes. Although STD funding was organized through the B-H Science Fund, the sources of development were not faculties but "industrial" research and development centers and institutes. This is especially true of projects with so-called 'social objectives', as strategic priorities of B-H in STD, and also for strategic programs, which were funded by the Federal Government of SFRY. In brief, the participants in STD were huge industrial systems and their research divisions. This fact is an extremely important one, since the STD infrastructure in B-H has completely disintegrated due to technological and economic problems these systems have been faced with since 1995.

The participation in STD international programs was coordinated through the B-H Institute for Scientific, Technological, Educational and Cultural Co-operation.

### 2.3. The Existing Level of STD in B-H

In the majority of the industrial branches, which used to represent the backbone of the economy, and thereby also of technological development, the rate of technological development for B-H was negative even before the 1990's. Further diminution, due both to physical destruction during the war, and to poor usage of the facilities after the war, occurred in the 90's. The examples which confirm this are companies operating in the classic industrial branches such as: RMK Zenica, SODA- SO Tuzla Chemical Complex, and the metal industry led by the UNIS complex. Along with wartime destruction, the basic character of the structure of B-H industry, as well as the socio-economic system, which failed to stimulate technological development, represent also crucial reasons for the contraction in technological development and for the present low development rate.

The situation in regard to human resources, as the carriers of technological transformations, also demonstrates a negative trend. During the last decade the most skilled persons left the country, and most of those who remained have neglected their further professional development. New personnel in a position to play an active role in industry, although not lacking enthusiasm, still cannot meet the demands of technological development and for the most part are in the process of learning from their own mistakes. An especially critical situation exists with regard to "new leaders", young managers who possess the knowledge and techniques needed for technological development in the 21$^{st}$ century global economy. Especially concerning is the situation in governments, where generations of ministers have shown a catastrophic level of (lack of) knowledge in the domain of business development and management skills, as well as in understanding the importance of STD for economic development of the country. The qualifications of persons who completed their higher education during the war is also questionable, as well as their ability to apply the obtained knowledge in creating innovations.

A disturbing fact is that the university is perceived as exclusively an educational institution, and to a great extent it has been reduced to only this function of the transfer of knowledge. Specifically, two integrative functions: the generation of knowledge, that is scientific and research work, and the transfer of knowledge to the environment, or application and development work, are being cultivated very little or almost not at all at universities. The constitutional and legal organization of B-H contributes to the further regression of higher education, in line with which higher education

and science were placed under the competencies of cantons in FB-H and at the Entity level in RS, and in this way being additionally fragmentized. The situation is even worse with regard to industrial institutes. Parts of these institutions (estimated to be not more than 10-15 % of pre-war capacities) still function, mostly in the field of engineering activities, project design and activities related to routine examination and evaluation. The research and development function of these institutions has completely vanished.

### 2.4. The Status of Higher Education in B-H after the Dayton Agreement

In accordance with the Dayton Agreement and the Washington Agreement higher education is decentralized. As a result, the separate governments, which have responsibilities in accordance with these Agreements (cantons in FB-H and the RS Government) in regard to higher education, do not mutually integrate and co-ordinate their activities. Negative consequences of such a legal situation and of wartime destruction for higher education are as follows:

- Standards and norms have not been adopted for the most part, and those have been adopted have not been integrated
- Curricula and syllabuses have not been standardized
- A conglomerate of higher education institutions exist with uncoordinated and often conflicting roles, functions and objectives
- Total number of faculties and other university institutions at seven existing universities is 75
- Technical and other financial possibilities for managing a modern system of higher education are restricted
- The higher education system is irrational and non-functional
- Most of the higher education institutions have a critical lack of productive professional staff
- Higher education institutions are inadequately equipped
- Access to Internet is inadequate despite attempts to establish BIHARNET.

In general, the organization of higher education, as foreseen in the Dayton Agreement, has, as a consequence, fragmented higher education with a prevailing political influence at universities. The Federation Ministry of Education, Science, Culture and Sport has been given a marginal role in FB-H and it does not even play an essential coordinating role in this field. Restricted financial capabilities of respective budgets imperil the organization of even elementary educational activities for higher education.

## 3. Restructuring and Transition of Higher Education and STD in B-H

In this section we direct our attention to the significance of integration of the transition of higher education and scientific and technological development (STD) in a strategy for the B-H economy restructuring. Special focus is given to the analysis of proposals developed by local actors, as well as analysis of the program implemented in this field within international assistance programs for B-H.

### 3.1. Consequences of Restructuring and Transition of Higher Education in B-H

Among all the factors of technological development, higher education is the area within which state programs may be used maximally to influence an increase of technological competition of companies and of the state as a whole. In B-H higher education is predominantly, i.e. almost entirely, of a public nature.

The current situation for higher education in B-H does not meet the needs or requirements of B-H development. Section 2.4 provides a detailed description of the organizational mode and the current situation in higher education institutions in B-H. Although the need for reconstruction and transition of higher education in B-H is generally accepted, there is no clearly defined strategy for the transition of the higher education system in B-H.

This sector was not in the focus of international direct assistance in the period between 1996 and 1999. The following amounts of donations intended for education were approved:

- $ 110 million in 1995/96
- $ 49 million in 1997
- $ 13 million in 1998

Assistance focused on physical reconstruction, of which the part of higher education in the relevant programs was less than 10%. Lately, there is a shift of focus of international assistance from physical reconstruction to programs supporting reform and introduction of standards and norms.

During the immediate post-war period, it was only the PHARE Tempus program of EC that focused on higher education. In November 1997, ETF, involved in the Tempus program implementation, defined the priorities of support for higher education in B-H.

- Projects for the improvement of university management (strategic planning, financial planning and financial management, development of an Office for International Co-operation)
- Programs for support to foreign language departments at the local universities and teaching university administration in foreign languages
- Validation and formal recognition of diplomas
- Support to development of strategically important sectors (modern languages, public administration, economy and management, pedagogical disciplines and applied social sciences).

In November 1999 the World Bank and the Council of Europe produced a detailed analysis of the situation in and needs of the B-H educational system, encompassing higher education, also. This study defines the following priorities of intervention:

- The existing model of management of faculties and universities, as an association of faculties, and the lack of institutional co-ordination and co-operation within higher education, are a basic structural and institutional problem. Therefore an organizational restructuring of the universities in B-H is proposed, with the formation of a Higher Education Co-ordination Body.
- The existing funding system for higher education contains barriers to development in this area. In the best case funding is done by numbers of students, thus mainly a direct funding of the faculties (departments/schools).

For this reason, what is proposed is the following:

- Identification of an institutional basis for co-ordination of a coherent development of certain disciplines of higher education throughout the territory of Bosnia-Herzegovina.
- Establishment of mechanisms for qualification and principles of accreditation and funding of higher education by sectors/disciplines.
- Elaboration of a higher education development strategy by sectors.
- The higher education curricula need to be changed, together with preparations for adaptation to be in accordance with the Bologna Declaration on Higher Education in Europe. New curricula profiles should be introduced, with a view to meeting the requirements of B-H development within the market economy of the 21$^{st}$ century.
- The curricula should be based on a flexible credit system, of a modular structure, together with introduction of a quality control system.

- It is necessary to support projects and programs of regional interconnection of higher education institutions and their inclusion into international networks and programs (first and foremost of the EU).

The above analysis shows clearly the need for the restructuring of higher education, and areas for intervention have been identified. However, local B-H governments have not adopted strategies and reform programs, nor does international development assistance give due attention to this area, particularly in financial projections. For this reason, changes are minor, even negligible, and it can be said that the higher education transition process has not yet begun. Resistance to change occurs not only in ruling political circles, but also in the higher education institutions themselves (although there have been some initial breakthroughs in restructuring the organization of Tuzla University).

### 3.2. Restructuring the STD Concept in B-H

The concept of economic development of B-H will determine the B-H STD concept. Analysis of two documents: Strategy of Economic Development of B-H (UNDP funded project, 1996) and Global B-H Economic Strategy Framework 2000-2004 (the B-H Council of Ministers' project supported by the World Bank), reveals important differences in approaches to STD strategy. While the 1996 document, in its Chapter on Industrial Policies, supports the significance and importance of industrial policy, and thereby STD, in economic development, the latter document excluded from its focus the technological component in development of companies and entrepreneurship.

It is therefore necessary to proceed to a develop of STD strategy as an important part of the general development strategy. Such a document should contain the STD system concept, respecting the changes which have occurred relative to the pre-war situation.

- Decentralization of decision-making on STD
- Changing of industrial structure caused by collapse of the industrial system and emphasis on entrepreneurship and small and medium-size enterprises as pillars of the economy.

It is essential to develop a network of institutions, which will carry out technological support for enterprises (ministries, research institutions, technological centers, incubators and parks, etc.). This will inevitably result in the need for restructuring the remaining STD institutions. On balance, the transition of the system should emphasize the increased role of the market, the principle of competitiveness of institutions and projects as well as provision of sources of funding for STD. At the same time, a diversification of the sources of funding of projects will need to be accentuated: sources will be budgeted funds, private enterprises and international programs. The restructuring of the scientific-technological system in B-H and in countries in transition should generally be considered within the framework of the process of transition from a central and planned economy to an open market economy. On the one hand, this process offers totally new possibilities of technological modernization but, at the same time, it carries the potential danger of technological marginalization. Its openness to foreign competition and increased presence in foreign markets result in direct pressure on the enterprises and sectors toward technological improvement and restructuring. The presence of foreign investors in the country opens up new possibilities and forms of technology transfers, which, in turn, increases the possibility for technological integration in technological and production networks of economically developed countries.

Technological development of B-H will greatly depend on an active State policy and concept of economic development, i.e. a strategy for repositioning B-H in the international division of labour. In this the technological aspect of development cannot be neglected.

### 3.3. Proposal for the Concept of Scientific Technological Development Management in B-H

At the level of reconstruction and development of Bosnia-Herzegovina thus far achieved at the threshold of the 21st century, it has been established that all three critical areas, namely, the educational subsystem, the research subsystem and economic production, are in crisis or economic depression and a state of stagnation (in the production of new knowledge). There is a global commitment towards ensuring an interconnection with foreign sources of technical progress for the intensive scientific and technical, technological and cultural supply of information for all three subsystems. Section 2.1 describes the STD management system which was operational in B-H prior to the war. In order for the system to revitalize, an appropriate communication system between the system elements must be restored, respecting the changed structure of the economy and the new constitutional system in B-H.

Accordingly, on principles of openness both internally (between regions) and externally (to foreign countries), there must be established and maintained continuous and adequate communication between education, production of goods and services, and the area of scientific and cultural research. The results of successful communication are: dissemination of modern scientific and professional knowledge (education); international competence in scientific knowledge; efficient transfer of technology (import, export); competition in production and exchange of products and services and technical/technological knowledge.

The process of management of technical and technological development may be established when:

- there is a freeing up of private initiative in entrepreneurship (building a system of market regulation in the trade of goods, services and capital) and, on that basis, there is formed a desire for knowledge in resolving entrepreneurial social and economic problems;
- the levels of turnover tax, company income tax, and salary tax have been equalized and begin serving the purpose of encouraging development of economic activities;
- investment in small business has been encouraged, by reducing the tax base according to the amount and date of payment for investments;
- a value added tax (VAT) has been introduced;
- foreign investment has been encouraged by an accelerated privatization process, ratification of international conventions on the protection of investments, and eradication of double taxation;
- an efficient judicial apparatus has been installed and economic legislation has been adopted to regulate the establishment and conduct of business for producers and sales agents and on the protection of consumers and creditors in sales, in accordance with market economy norms applicable in the European Union;
- long-term maintenance of a strategy of establishing competitive operations in the business environment of B-H has been achieved.

In pursuance of the B-H Constitution contained in the Dayton Agreement, it will be necessary to establish institutions and mechanisms of management of STD at the levels of B-H, FB-H and RS, with the co-ordination of activities at the Cantonal level. A particular challenge is the development of a model of technology transfer and encouragement of innovations in small and medium-size enterprises. The technological component of restructuring of companies should also be given due attention.

Respecting the fact that huge business systems are no longer able to lead technological development, the only possibility left is the integration of existing scientific research and development capacities at the universities in B-H. As technology transfer cannot realistically be expected to take place via foreign direct investment (FDI) in the said 2 or 3 years, it is necessary to develop a transfer model via STD organizations in STD international programs.

## 4. Analysis of Programs of International Support to Development of Higher Education and STD

### 4.1. Analysis of the B-H Participation in STD Multilateral Programs

Section 1.3. provides a review of the priorities of multilateral programs of international development assistance to STD of developing countries and countries in transition. Section 3 provides the proposals which the scientific and professional community in B-H and the international community defined within STD.

This section is an analysis of the success of the participation of institutions and organizations from B-H in the mentioned multilateral programs, in which B-H may take part.

Since there is no Ministry for Science and Technology at the B-H level, the Institute for International, Scientific, Technical, Educational and Cultural Co-operation, within the Ministry of Foreign Affairs, has been defined as the institutional framework for international projects and program co-ordination in the area of STD. On the basis of available information, one can conclude that participation of B-H in multilateral programs is at a very low level.

There are a number of reasons for this:

1. B-H has no strategy for scientific and technological development, and therefore no priorities for technological development.
2. There is no institutional structure for STD. There are no institutions for STD at the Entity level (although there is a Ministry for Industry and Technology in the RS), let alone at the level of Cantons, having the responsibility for science and higher education.
3. The institutions in B-H are unable to take an active part in international programs and projects in terms of both their organization and staff.
4. There are no funds for scientific and technological development in B-H. Therefore, not only is there no project funding in B-H, there are also no means which would be required to co-finance participation of B-H institutions in international projects requiring such participation.
5. There is neither an organized data base nor a network of centers capable of providing information on STD international projects.

An analysis of the current situation in STD in B-H indicates that the trend of B-H participation in these programs will not change significantly without a more active participation of the state institutions of B-H.

### 4.2. Analysis of the Direct Assistance Program to B-H in STD

It follows clearly from the preceding section that B-H is not equipped to take equal part in international STD programs. Therefore, there was a requirement in the period between 1995 and 2000 to define and realize programs and projects of direct assistance to B-H capacity and institution building for STD.

During 1996, at numerous conferences organized in the stage of preparation of the B-H Priority Reconstruction Program, many local officials indicated the necessity of more focused attention to be paid to STD, in particular to higher education.

Despite the initiatives that were made, the priority reconstruction programs, coordinated by the World Bank, have completely neglected this area. The explanation, given during the preparation stage of projects by World Bank officials, was that the EC would render its assistance to higher education and STD through its programs. In light of this position, B-H international assistance programs, from the STD aspect, are characterized by:

- Complete absence of systematic planning in the STD field
- Absence of technology as an important component of economic reconstruction and enterprise restructuring, which considerably reduces the effect of the support program

- Existence of a short-term effect of particular programs of support to technological development (BIHARNET example) due to disassociation between economic recovery and reconstruction programs and institutional strengthening of higher education and STD systems.

Absence of STD programs and projects has resulted in the very negative consequence of "internal" outflow of qualified personnel, particularly ICT (information communication technologies) specialists from B-H companies and higher education institutions to international organizations. These qualified persons are, unfortunately, very often hired for simple and routine duties, often outside of their profession.

Ignoring totally the role of technology in economic recovery and reconstruction has resulted in the fall of interest in engineering and technological studies. This effect, in combination with the "departure" of qualified young engineers to foreign countries (recently, particularly to the EU countries) will lead to a long term deficit in these professions, which can have disastrous consequences for economic development of B-H.

It is clear that the largest part of the blame for this manner of implementing direct international assistance of STD to B-H lies with the local authorities. The very fact that B-H does not even have a global framework of technological development which would be complemented with a global framework of economic development strategy indicates how much technology and technological development is in focus when it comes to visions of development of B-H.

### 4.3. Analysis of Selected "Case Studies"

As is evident from the previous analyses, technological development and technology, as a component of economic development, has not been in the focus of the B-H recovery and reconstruction program.

There was no technological component available in the programs for direct support to enterprises. This is why analysis must be based on case studies.

Two projects have been analyzed in order to find a "best practice" indicator:

- The project of the Government of the Republic of Slovenia: BIHARNET, COBISS
- USAID and US Government integrated project on the development of the Clinic for Cardio-Vascular Diseases, UKC Tuzla, for open-heart surgery.

The example from the field of medicine was taken as a successful project for the transfer of know-how in one highly specialized area, while BIHARNET was taken as an example of a less successful project for the use of ICT technologies.

These examples allow us to define some principles or critical factors of success of STD projects.

The following are the preconditions for a successful project:

- Long-term financial self-sustainability under market economy conditions
- Full support and integration in the projects on the part of local actors: political and the ultimate beneficiaries
- The existence of a reliable long-term strategic partner, who will have a marker-oriented interest in the project
- Human resource development
- Reliance on local institutions (with a decisive influence of local actors)

## 5. Proposal of New Policies in Higher Education and STD

### 5.1. Proposal of New Policies in the Field of Higher Education

Various international organizations have recently increased their focus on higher education. At present, the projects of the World Bank and PHARE Tempus for SEE countries are being implemented via OHR, Council of Europe and CEPS. The formation of a single information center (MIS) has been planned.

In essence, the planned projects are in line with the defined priorities of the reform of higher education. However, in financial terms, the projects do not correspond to the set interventions, which is why it would be difficult to expect rapid changes. Potentially influential programs could be projects of regional co-operation within the Tempus Program and the Stability pact.

All these programs may be criticized for their focusing on only one university activity: education. Universities are successful if their overall activities encompass the three functions described as follows:

- Scientific and research activity, as the process of creating knowledge
- Education, as the process of transfer of knowledge
- Research and development projects and the function of transfer of technologies and knowledge as dissemination and application of knowledge in the region

The reduction of intervention by the international community down to only one of these, although it is the most important activity at this stage, is also the reduction of the possibility for genuine reform of higher education.

### 5.2. Proposal for New Policies in STD in B-H

B-H has no resources of its own (human, organizational and financial) which would be necessary for the process of restructuring STD. This is why it is necessary to define STD as one of the priorities for future interventions of the international community in B-H, specifically within a program for sustainable economic development and restructuring. Technological development and management of technologies are one of the key pillars of a sustainable economy. This is specifically true for economies with an extremely high percentage of participation of small and medium-size enterprises in the economic structure. In addition to financial and non-financial consultancy services, these enterprises require a systemic support in technology transfer services, technological co-operation and development, support to innovations, and so forth.

The EC strategies and concepts of support to the technological development of undeveloped regions of EU, as well as the experience in the development of currently technologically developed countries of the Far East (“seven tigers”), may serve as basic material in preparing an STD program. An STD management concept is proposed in section 3.3. as an initial proposal for further discussion.

#### 5.2.1. New STD policy at the B-H level

- It is necessary to institutionalize the function of science and technology at the B-H level. In the recommendations given at the scientific gathering of the B-H Academy of Science and Arts (1996) establishment of the Ministry of Science and Technology at the B-H level was proposed.
- It is necessary to develop a B-H Strategy of Scientific and Technological Development.
- It is necessary to strengthen competent state institutions at all levels with the aim of coordinating and establishing international scientific and technological co-operation and a systematic utilization of international technological and financial assistance to B-H.

- It is necessary to conclude multilateral and bilateral agreements with international organizations and to identify periodical co-operation programs.

An unavoidable segment in all the above-mentioned priorities is the intervention of the International Community, and especially in rehabilitation of the infrastructure of scientific and technological sectors (academic and research informative networks, info centers, innovation and technology transfer centers, etc.).

Development of a network of technological development support centers in B-H is justified and such a project can be only implemented at the B-H level.

Pertaining to the development of such a project, the International Community should significantly emphasize regional co-operation and development of regional networks (within B-H, within the South Eastern Europe region and in connection with EU regions).

### 5.2.2. New STD policies at the Regional Level in B-H

Even though B-H is not a State organized on the basis of economic regions, the new policies of B-H technological development at the "local" level might be based on regional principles. The European Commission has stated its intention to channel all forthcoming assistance to economic development through Regional Development Agencies, so that the term economic region will be introduced into the practice of international assistance to B-H.

The technological development concept at the regional level is directed towards the establishment of networks of organizations (incubator business centers, technological centers, technological parks), which would accomplish development, transfer and utilization of modern technologies appropriate to development needs and the possibilities of the gravitating economic territory, in an optimally rapid and organizationally efficient manner.

Specifically, it was noticed both by the EU and in countries in transition (e.g. Slovenia) that small-size companies represent a dynamic source of employment, development and competition only if they are aware of the fact that the authorities have to develop an overall strategy of support to these companies, which includes a strategy of assistance for technology and innovations.

As convenient preliminary materials in developing a strategy and programs one may use:

- *Green Paper on Innovation*, EU (1996)
- *Challenges for Enterprise Policy in the Knowledge-Driven Economy*, EC Multiannual Programme for Enterprise and Entrepreneurship 2001-2005 (May 2000)

The second document stresses in particular the preparation of EU companies for work and development in the economy of the 21st century, the so-called e-economy (digital economy), which is based on creative and innovative utilization of ICT and multimedia communications.

Finally, the establishment of technological centers and/or scientific-technological parks in co-operation with and/or within B-H faculties and universities, will be conducive to achieving an integral effect also within STD and the education of students, based on the orientation of their education for solving concrete problems of the economy in B-H.

#### References

Commission of the European Communities (2000) *Challenges for Enterprise Policy in the Knowledge-Driven Economy.* Proposal for a Council Decision on a Multiannual Programme for Enterprise and Entrepreneurship (2001-2005).http://europa.eu.int/comm/enterprise/enterprise_policy/mult_entr_programme/doc/com2000_0256en.pdf

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